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April 7, 2010

Please Note:

The Letter Health Consultation, *Rainier Commons LLC Polychlorinated Biphenyls (PCBs) Paint Contamination, Seattle, King County, Washington*, is the initial health assessment for this site. It was developed to address a particular question about potential health threats from accidentally breathing in PCBs in paint chip dust. As new information becomes available for this site, additional health assessments will be developed.

Sincerely,

Lenford O'Garro
Health Assessor
Site Assessment Section

Letter Health Consultation

Rainier Commons LLC Polychlorinated Biphenyls (PCBs) Paint Contamination
Seattle, King County, Washington

March 10, 2010

Prepared by

The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

DOH 334-227 March 2010

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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LETTER HEALTH CONSULTATION

Rainier Commons LLC Polychlorinated Biphenyls (PCBs)
Paint Contamination

SEATTLE, KING COUNTY, WASHINGTON

Prepared By:

Washington State Department of Health
Under Cooperative Agreement with the
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Letter Health Consultation

March 9, 2010

TO: Dan Cargill
Washington State Department of Ecology (Ecology)

FROM: Lenford O'Garro
Washington State Department of Health (DOH)

SUBJECT: Rainier Commons LLC Polychlorinated Biphenyls (PCBs) Paint contamination

Statement of Issues:

The Washington State Department of Health (DOH) prepared this Letter Health Consultation (LHC) at the request of Washington State Department of Ecology (Ecology). The purpose is to evaluate whether PCBs found in paint chips from the Rainier Commons building, Seattle, Washington pose a health hazard to humans. DOH prepares letter health consultations under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR).

Background:

Rainier Commons LLC is the former Rainier Brewery building located in the Georgetown district of south Seattle, King County, Washington. The brewery was built in 1884 on about 4.6 acres with 26 buildings along Airport Way South. Today, the properties are used for artist lofts, restaurants, coffee roasting operations, and storage facilities [1].

In October 2005, the City of Seattle Public Utility Department (SPU) sampled sediment from stormwater collection system around the old brewery. PCBs were found at very high levels ranging from 17.5 ppm to 2,200 ppm [1]. In May 2006, consultants for Rainier Commons sampled stormwater collection system sediment from around the old brewery and the exterior paint [1]. The exterior paint contained PCBs (Aroclor 1254) at 2,300 ppm. In January 2008, SPU resampled the stormwater collection system sediment around the old brewery and found lower concentrations. In February 2008, SPU removed the PCB contaminated sediments from the

stormwater collection system. In March 2009, the EPA Region 10 inspection team visited the site and collected exterior paint chips from the old brewery building (see Figure 1). They also collected a sample from between the gravel strip and the paint chips that had migrated towards the catch basin (See Table 1), as well as from a stormwater collection system sediment trap. Oil leaking from an elevator gearbox was also sampled.

In June 2009, the Environmental Protection Agency (EPA) contacted and informed the owners of Rainer Commons that paint containing PCBs at levels > 50 ppm is not authorized for use under the Toxic Substances Control Act (TSCA) and PCB regulations and must be removed. Currently, the EPA is working with the facility on a plan to properly remove and dispose of the contaminated paint. In October 2009, a draft health and safety plan for the paint removal pilot test on Building 13 was presented to the EPA. The Methods to be tested include ultra high pressure hydro blasting, abrasive blasting, and chemical stripping [2].

Table 1. Maximum concentrations of PCB detected in 2009 at the Rainier Commons site in Seattle, Washington.

Location	Compound	Maximum Concentration (ppm)	Comparison Value (ppm)	Comparison Value Reference	Contaminant of Concern (COC)
Exterior Wall paint chips	PCB	794.7	0.4	CREG	Yes
On ground paint chips		10,490.5			Yes
Sediment Trap		101			Yes
Gearbox oil		0.0089			No

CREG - ATSDR's Cancer Risk Evaluation Guide
PPM – parts per million

Discussion:

Contaminants of Concern

Contaminants of concern (COC) in paint chips were determined by employing a screening process. Maximum paint chips contaminant (dust) levels were screened against health-based soil comparison values. Cancer risk evaluation guide (CREG) type of health-based comparison or screening values was used during this process. Comparison values such as the CREG offer a high degree of protection and assurance that people are unlikely to be harmed by contaminants in the environment. For chemicals that cause cancer, the comparison values represent levels that are calculated to increase the risk of cancer by about one in a million. These types of comparison values often form the basis for cleanup. In general, if a contaminant's maximum concentration is greater than its comparison value, then the contaminant is evaluated further.

Exposure Pathways

In order for any contaminant to be a health concern, the contaminant must be present at a high enough concentration to cause potential harm, and there must be a completed route of exposure to people. This is an industrial area and the commercial businesses in these buildings cater mainly for workers in this area. The buildings are surrounded by paved parking lots with a small gravel area (see Figure 1). To the west of the buildings is Airport Way South road and to the east is the Interstate 5 corridor. Children are unlikely to be playing in the area, the nearest residential neighborhood in the lower section is about two miles southwest. On the east side the nearest residential neighborhood is about two-tenth of a mile, however, it's across the Interstate 5 corridor, separated by a steep hillside, a forested area and no through access road. Therefore, the exposure pathway of concern at this site is of an adult accidentally breathing in PCBs in paint chips (in the form of dust) during starting or sitting in a vehicle onsite or working in and around the buildings. Ingestion and dermal contact of the PCB paint chips were not evaluated. The exterior wall paint is flaking off the building within two feet of the gravel area next to parking lot and given this location, these types of exposures are unlikely (see Figure 1).

Since the paint chips have been identified as containing high levels of PCBs, any remediation will have to follow the Occupational Safety and Health Administration rules and regulations (Washington State Department of Labor and Industries, and 40 Code of Federal Regulations (C.F.R.) Part 761 for specific requirements relating to PCBs and PCB-containing materials. Therefore, safety measures must be taken to reduce exposure during removal and disposal of the PCB paint.

Chemical Specific Toxicity

PCBs are a mixture of man-made organic chemicals. There are no known natural sources of PCBs in the environment. The manufacture of PCBs stopped in the United States (U.S.) in 1977, because evidence showed that they could build up in the environment and cause toxic health effects. Although no longer manufactured, PCBs can still be found in certain products such as old fluorescent lighting fixtures, electrical devices or appliances containing PCB capacitors that were made before the use of PCBs was banned, old microscope oil, and old hydraulic oil. Prior to 1977, PCBs entered the environment (soil, water, air) during the manufacture and use of PCBs. Today, PCBs can still enter the environment from poorly maintained hazardous waste sites; illegal or improper dumping of PCB wastes, such as old hydraulic oil; leaks from electrical transformers that contain PCB oils; and disposal of old consumer products that contain PCBs[3].

PCBs entered the environment as mixtures. There are 209 structural variations of PCBs, referred to as congeners, which differ in the number and location of chlorine atoms in the chemical structure. Most PCBs commercially produced in the U.S. were standard mixtures called Aroclors. The conditions for producing each Aroclor favor the synthesis of certain congeners, giving each Aroclor a unique pattern based on its congener composition. No Aroclor contains all 209 congeners. Once in the environment, PCBs do not breakdown easily and may stay in the soil for months or years. PCBs stick to soil and sediment and do not usually move deep into the soil with rainfall. As a result, PCBs are found worldwide. Small amounts of PCBs can be found in

almost all outdoor and indoor air, soil, sediments, surface water, and animals. PCBs bioaccumulate in the food chain and are stored in the fat tissue. The major dietary source of PCBs is fish. PCBs are also found in meats and dairy products [3]. However, the general trends of PCBs in humans have largely decreased since the 1980s [4, 5].

In general, direct exposure to contaminants can occur by ingestion, inhalation, and dermal (skin) contact. Some of the PCBs that enter the body are metabolized and excreted from the body within a few days; others stay in the body fat and liver for months and even years. PCBs collect in milk fat and can enter the bodies of infants through breast-feeding [3]. Skin irritation, vomiting, nausea, diarrhea, abdominal pain, eye irritation, and liver damage can occur in people exposed to high levels of PCBs [3]. However, health effects relevant to low-level environmental exposures are immunological effects in monkeys (Aroclor 1254, oral reference dose (RfD) 0.00002 mg/kg/day) and developmental effects in kids exposed to PCBs in the womb, from mothers eating PCB contaminated fish [3].

Evaluating Non-cancer Hazards

Exposure assumptions for estimating contaminant doses from PCB exposures are found in Appendix A, Table A1. In order to evaluate the potential for non-cancer adverse health affects that may result from exposure to contaminated media (i.e., soil, air, and water), a dose is estimated for PCBs. These doses are calculated for situations (scenarios) in which a person might be exposed to the contaminated media. The estimated dose for each contaminant under each scenario is then compared to EPA's RfD. RfDs are doses below which non-cancer adverse health effects are not expected to occur (so-called "safe" doses). They are derived from toxic effect levels obtained from human population and laboratory animal studies. These toxic effect levels can be either the lowest observed adverse effect level (LOAEL) or the no-observed adverse effect level (NOAEL). In human or animal studies, the LOAEL is the lowest dose at which an adverse health effect is seen, while the NOAEL is the highest dose that does not result in any adverse health effects.

Because of data uncertainty, the toxic effect level is divided by "safety factors" to produce the lower and more protective RfD. If a dose exceeds the RfD, this indicates only the potential for adverse health effects. The magnitude of this potential can be inferred from the degree to which this value is exceeded. If the estimated exposure dose is only slightly above the RfD, then that dose will fall well below the observed toxic effect level. The higher the estimated dose is above the RfD, the closer it will be to the actual observed toxic effect level. This comparison is called a hazard quotient (HQ) and is given by the equation below:

$$HQ = \frac{\text{Estimated Dose (mg/kg-day)}}{\text{RfD (mg/kg-day)}}$$

Estimated exposure doses, exposure assumptions, and hazard quotients are presented in Appendix A for PCB paint dust. Based on exposure estimates quantified in Appendix A, workers are not likely to experience adverse non-cancer health effects from exposure to PCB paint dust since the estimated exposure dose does not exceed the RfD or MRL.

Evaluating Cancer Risk

Some chemicals have the ability to cause cancer. Theoretical cancer risk is estimated by calculating a dose similar to that described above and multiplying it by a cancer potency factor, also known as the cancer slope factor. Some cancer potency factors are derived from human population data. Others are derived from laboratory animal studies involving doses much higher than are encountered in the environment. Use of animal data requires extrapolation of the cancer potency obtained from these high dose studies down to real-world exposures. This process involves much uncertainty.

Current regulatory practice assumes there is no "safe dose" of a carcinogen. Any dose of a carcinogen will result in some additional cancer risk. Theoretical cancer risk estimates are, therefore, not yes/no answers but measures of chance (probability). Such measures, however uncertain, are useful in determining the magnitude of a cancer threat because any level of a carcinogenic contaminant carries an associated risk. The validity of the "no safe dose" assumption for all cancer-causing chemicals is not clear. Some evidence suggests that certain chemicals considered to be carcinogenic must exceed a threshold of tolerance before initiating cancer. For such chemicals, risk estimates are not appropriate. Recent guidelines on cancer risk from EPA reflect the potential that thresholds for some carcinogenesis exist. However, EPA still assumes no threshold unless sufficient data indicate otherwise [6].

Theoretical Cancer Risk

Theoretical Cancer risk estimates do not reach zero no matter how low the level of exposure to a carcinogen. Terms used to describe this risk are defined below as the number of excess cancers expected in a lifetime:

Term		# of Excess Cancers
moderate	is approximately equal to	1 in 1,000
low	is approximately equal to	1 in 10,000
very low	is approximately equal to	1 in 100,000
slight	is approximately equal to	1 in 1,000,000
insignificant	is less than	1 in 1,000,000

This document describes theoretical cancer risk that is attributable to site-related contaminants in qualitative terms like low, very low, slight, and no significant increase in theoretical cancer risk. These terms can be better understood by considering the population size required for such an estimate to result in a single cancer case. For example, a low increase in cancer risk indicates an estimate in the range of one cancer case per ten thousand persons exposed over a lifetime. A very low estimate might result in one cancer case per several tens of thousands exposed over a lifetime and a slight estimate would require an exposed population of several hundreds of thousands to result in a single case. DOH considers theoretical cancer risk insignificant when the estimate results in less than one cancer per one million exposed over a lifetime. The reader should note that these estimates are for excess cancers that might result in addition to those normally expected in an unexposed population.

Cancer is a common illness and its occurrence in a population increases with the age of the population. There are many different forms of cancer resulting from a variety of causes; not all are fatal. Approximately 1/4 to 1/3 of people living in the U.S. will develop cancer at some point in their lives [7].

In a worst-case scenario, exposure to the current highest levels of PCBs would increase a person's lifetime theoretical cancer risk by about 2 in 1,000,000 (2 excess cancers in a population of a million people exposed) (see Appendix A - Table A3). The reader should note that these estimates are for excess cancers that might result in addition to those normally expected in an unexposed population. This estimated risk is very low to slight, and within the range of cancer risks consider acceptable by the EPA.

Conclusions

DOH concludes that accidentally breathing in PCBs from paint chips (dust) from the Rainier Commons building is not expected to harm people's health. Accidentally breathing in PCBs found in paint chips (dust) at the 2009 maximum levels while idling onsite or working in the buildings were lower than levels that are expected to harm human health.

Recommendations

- DOH recommends Rainier Commons LLC do grid sampling of the building exterior paint to obtain an average concentration of PCBs.

- DOH recommends Rainier Commons LLC follows Washington State Department of Labor and Industries rules and regulations and the regulations at 40 C.F.R. Part 761 for specific requirements relating to PCBs and PCB-containing materials.

Public Health Action Plan

Actions Planned

1. DOH will provide copies of this letter health consultation to the EPA, Ecology, Public Health-Seattle and King County, tenants, and the owners of the Rainier Commons buildings.

2. DOH will evaluate any additional data that becomes available.

Please feel free to contact Lenford O'Garro at (360) 236-3376 or 1-877-485-7316 if you have any questions about this memo.

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Appendix A

This section provides calculated exposure dose and assumptions used for exposure to PCBs in paint chips from the Rainier Commons building in Seattle, Washington. This exposure scenario was developed to model exposures that might occur to an adult worker. The following exposure parameters and dose equation was used to estimate exposure dose from inhalation of PCBs.

Exposure to PCBs in paint chips via inhalation (fugitive dust emissions)

For inhalation of soil particulates, air concentrations were estimated using the EPA Particulate Emission Factor (PEF) approach, as documented in EPA's Soil Screening Guidance [8].

Inhalation Route

$$Dose_{non\text{-}cancer\ (mg/kg\text{-}day)} = \frac{C \times SMF \times IHR \times EF \times ED \times 1/PEF}{BW \times AT_{non\text{-}cancer}} \quad [8]$$

$$\text{Cancer Risk} = \frac{C \times SMF \times IHR \times EF \times ED \times CPF \times 1/PEF}{BW \times AT_{cancer}} \quad [8]$$

Table A1. Exposure assumptions used for exposure to PCBs paint chips from the Rainier Commons building in Seattle, Washington.

Parameter	Value	Unit	Comments
Concentration (C)	10,490.5	mg/kg	Maximum detected value in paint chips
Exposure Frequency (EF)	250	Days/year	Average work days per year
Exposure Duration (ED)	25	years	Number of years at work (adult yrs)
Body Weight (BW) - adult	72	kg	Adult mean body weight
Averaging $Time_{non\text{-}cancer}$ (AT)	1825	days	5 years
Averaging $Time_{cancer}$ (AT)	27375	days	75 years
Cancer Potency Factor (CPF)	2	$mg/kg\text{-}day^{-1}$	Source: EPA
Inhalation rate (IHR) - adult	15.2	m^3/day	Exposure Factors Handbook [9]
Soil matrix factor (SMF)	1	unitless	Non-cancer (nc) / cancer (c) - default
Particulate emission factor (PEF)	6.00E+8	m^3/kg	Model Parameters 0% grass cover [10]

Table A2. Non-cancer hazard calculations resulting from exposure to PCBs paint chips from the Rainier Commons building in Seattle, Washington.

Contaminant	Concentration (ppm)	Scenarios	Estimated Dose (mg/kg/day)	RfD (mg/kg/day)	Estimated Dose/ RfD
			Inhalation of Particulates		
PCB	10,490.5	Adult	4.22E-6	2.0E-5	0.21

RfD – reference dose
PPM – parts per million

Table A3. Cancer hazard calculations resulting from exposure to PCBs paint chips from the Rainier Commons building in Seattle, Washington.

Contaminant	Concentration (ppm)	Cancer Potency Factor ($mg/kg\text{-}day^{-1}$)	Scenario	Increased Cancer Risk
				Inhalation of Particulates
PCB	10,490.5	2	Adult	1.69E-6

RfD – reference dose
PPM – parts per million

Figure 1: Photograph of exterior wall paint flaking off Building 13 onto the gravel area next to parking lot at Rainier Commons LLC in King County, Seattle, Washington [1].

Certification

The Washington State Department of Health prepared this Letter Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedures existing at the time the health consultation was initiated. Editorial review was completed by the Cooperative Agreement partner.

Audra Henry
Technical Project Officer, CAPEB, DHAC
Agency for Toxic Substances & Disease Registry

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Alan W. Yarbrough
Team Lead, CAPEB, DHAC
Agency for Toxic Substances & Disease Registry